SCIENCE

[Entered at the Post-Office of New York, N.Y., as Second-Class Matter.]

A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.

EIGHTH YEAR.
VOL. XV. No. 383.

NEW YORK, JUNE 6, 1890.

SINGLE COPIES, TEN CENTS.
$3.50 PER YEAR, IN ADVANCE.

NEW SERIES OF PORTABLE TESTING AND RESISTANCE SETS.

WE print to day a description, with cuts, of a new series of portable testing and resistance sets. These sets were all designed in the laboratory of Messrs. Queen & Co., Philadelphia, and are intended to meet the requirements of electric-light men, telephone line construction, dynamo and motor manufacture, and general testing. They will be found adapted to the location of faults in telegraph and electric-light lines, determination of armature and field resistance of dynamos and motors, and the needs of government and other inspectors, as well as to general expert work.

The set shown in Fig. 1 is the most complete of the series, and is intended for all kinds of work where considerable accuracy is required. The coils in this set are, as is seen from the figure, arranged in four rows, each row being made up of ten coils of the

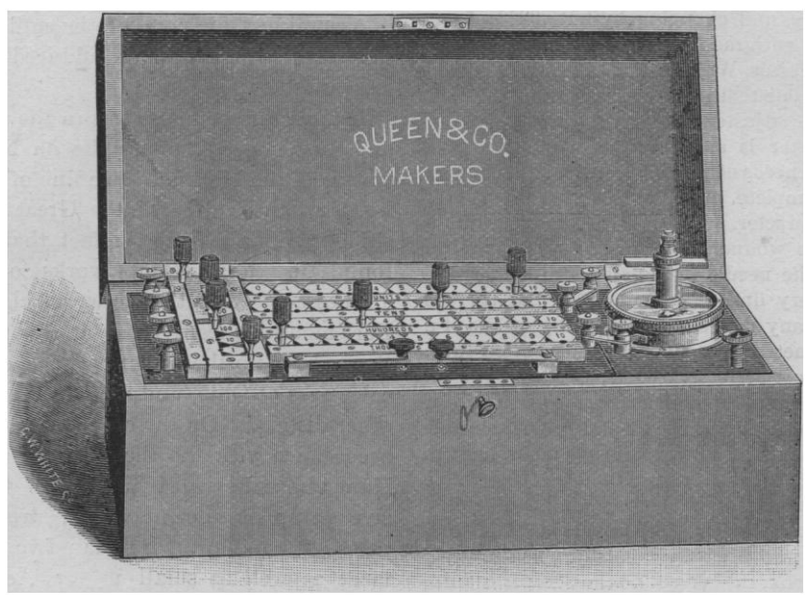

FIG. 1.

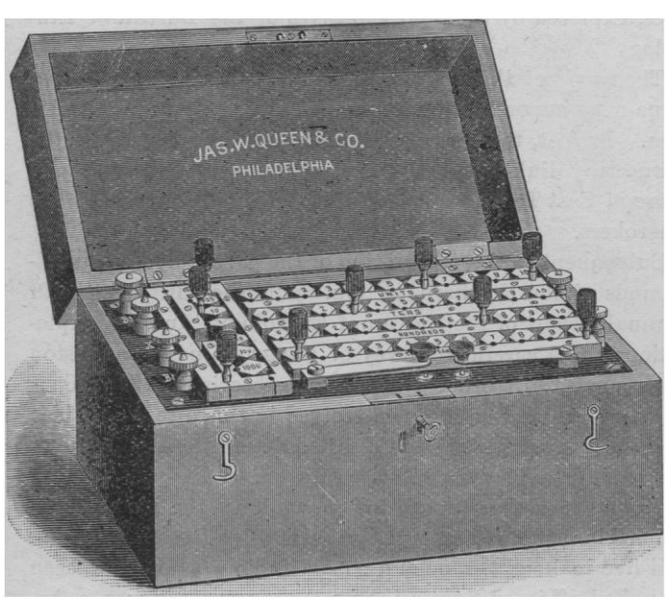

FIG. 2.

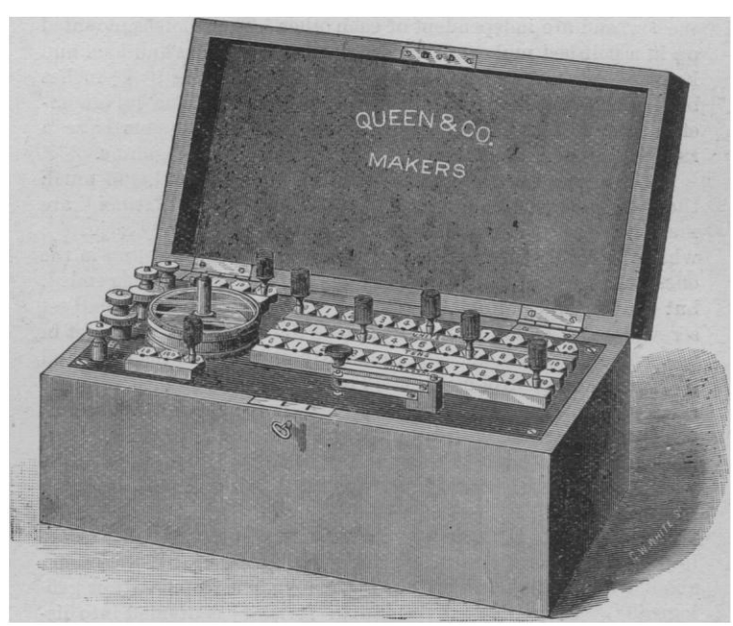

FIG. 3.

same denomination. The blocks in each row are numbered from left to right, and from zero to ten, while the longitudinal bars underneath have engraved upon them the denomination of the coils of that row. The connections of the coils are such that but one plug is required for each denomination. By inserting it in any block, as many coils of that denomination are thrown in as may be indicated by the particular number engraved upon the block. Thus, as the cut represents it, there are in circuit 369 ohms; i.e., no thousands, three hundreds, six tens, and nine units. Another feature of this set is the arrangement of the bridge-arms, which are seen at the left. These are combined with reversing-bars, so that the proportional arms may be instantly interchanged, — an operation which is necessary in many special methods. An additional advantage is, that but six coils are necessary in the bridge, instead of eight as usual, to get the proportion of 1 to 1,000, or 1,000 to 1, thus making the set smaller and more portable. The bridge-coils are 1, 10, and 100 on one side, and 10, 100, and 1,000 on the other. To effect this reversal, two plugs only have to be changed. The coils are platinoid wire, which has a very high specific resistance, and changing by but .0023 of one per cent for each degree Centigrade of temperature variation. They are adjusted by Professor William A. Anthony to an accuracy of from one fifth to one-tenth of one per cent, while the bridge-arms themselves are adjusted to a still higher degree of accuracy. The galvanometer is a successful adaptation of a laboratory instrument to the needs of portable work, and is claimed to be the most sensitive, complete, and portable instrument ever combined in a set of this character. The wire is of several hundred ohms resistance, and is wound so as to have a maximum effect upon the needle. The needle itself is an astatic one, and delicately suspended by a very fine cocoon fibre, so that there is practically no resistance to any deflecting force. By means of a very weak controlling magnet sliding upon the suspension-tube, the needle can be made almost perfectly astatic, and will show an appreciable deflection for currents as small as from $\frac{1}{8000}$ to $\frac{1}{5000}$ of an ampère. The brass box containing needle and coil is movable about a vertical axis; so that the needle can always be brought to zero, whatever the position of the box as a whole. The whole galvanometer lifts out of its position in the case, and can be used independently, or in connection with other apparatus if desired, three levelling-screws being provided for levelling when so used. By closing the cover of the box, the weight of the needles is automatically taken from the fibre, and the latter protected from injury. The battery and galvanometer-key are seen in the front of the box, and are independent of each other. The whole is mounted up in a polished mahogany box with leather handles and lock and key, and measures when complete but 18 inches long by 6½ inches broad. Fig. 2 is a cut of the same thing without the galvanometer, and it is of course somewhat shorter. These sets have a range of measurement from $\frac{1}{1000}$ of an ohm to 10 megohms.

Fig. 3 shows one of the other sets of the series, and is of much the same general character. The coils, instead of platinoid, are made of German silver, and are not quite so accurately adjusted, while the set is without the reversing arrangement found in the ones just described. The galvanometer also is fibre-suspended, but without the automatic release. For this purpose a small set screw is used, which allows the needle to be lowered when not in use. The galvanometer is permanently mounted in the case, and is without the control-magnet. The keys are combined into the regular double contact form. This set, as represented in the cut, has but three rows of resistance; viz., the units, tens, and hundreds. It is also made with an additional row of thousands. This set is also made without the galvanometer.

MESSRS. R. T. HILL and J. S. STONE have recently made some important explorations in southern Indian Territory,—a region about which little has hitherto been known geographically or geologically. They find that the Indian Territory is divided into distinct northern and southern divisions by the Ouachita mountain system. The southernmost of these divisions has been the special object of their studies, and they have secured most valuable data concerning it, as well as the history of the medial portion of Red River, which has not hitherto been investigated.

THE CHEROKEES IN PRE-COLUMBIAN TIMES.

III.

[IN *Science* of May 30, p. 324, in the previous article on this subject, Fig. 3 is incorrect. The correct figure will be given in the revised edition of these papers when published in book form.]

SUMMING up the evidence introduced, it leads to the following conclusions:—

1. That some of the Cherokees reached their historic seat before the year 1540, probably as early as the latter part of the thirteenth century.

2. That they came from some point to the north or northwest, apparently in the region of the Ohio River.

3. That some, if not all, of the mounds of western North Carolina and East Tennessee were built by the people of this tribe.

Assuming these points to be sufficiently established, let us see what evidence can be adduced indicating their line of migration.

If their former home was in the region of the Upper Ohio, and they stopped for a while on New River and the head waters of the Holston, their line of retreat was in all likelihood up the valley of the Great Kanawha. This supposition agrees also with the fact that no traces of them are found in the ancient works of Kentucky or middle Tennessee. In truth, the works along the Ohio River from Portsmouth (except those at this point) to Cincinnati, and throughout northern Kentucky, are different from the typical works of Ohio, and most of them of a type found in no other district. On the other hand, it happens, precisely in accordance with the theory advanced, that we find in the Kanawha valley, near the city of Charleston, a very extensive group of ancient works, stretching along the banks of the stream for more than two miles, consisting of quite large as well as small mounds, circular and rectangular enclosures, etc. A careful survey of this group has been made, and a number of the tumuli, including the larger ones, explored by the representatives of the Bureau of Ethnology.

The result of these explorations has been to bring to light some very important data bearing upon the present question. In fact, the discoveries made here seem to furnish the connecting link between some of the works of Ohio and those of East Tennessee and North Carolina ascribed to the Cherokees.

Subsequent to the preparation of the paper on the "Burial-Mounds of the Northern section," published in the "Fifth Annual Report of the Bureau of Ethnology," further explorations and a careful resurvey of the group near Charleston were made. In order to show the bearing of the data obtained on the questions involved in this discussion, it is necessary to give somewhat detailed descriptions of some of the mounds explored.

Mound 15 of this group (for convenience the numbers in the original sketch are used) was sixty-five feet in diameter and five in height, though a considerable portion had been ploughed off in cultivating the soil. In the top was a basin-shaped fire-bed somewhat oval in outline, being about seven feet long and four feet wide. This was composed of a mixture of clay and ashes burned to a brick red on the upper side; but the under side had a black, greasy appear-